Vision for Research Computing at UF

Research Computing Advisory Committee
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As a premier research institution, the University of Florida has invested in and utilizes a broad array of advanced information technologies. Prospering in a rapidly evolving technology environment and increasingly collaborative culture requires a substantial institutional commitment to "Research Computing". We sketch here a vision for Research Computing.

We propose to start by implementing a stable and sustainable High Performance Computing (HPC) Center that will provide substantial computational, storage and networking resources as well as strong application support for University of Florida researchers. Over the next five years we aim to significantly augment hardware and software resources, dramatically increase the number of computing support personnel and computational scientists, and promote institutional partnerships and technologies resulting in "radical collaboration" – fundamentally new partnerships of faculty, IT and computational specialists across UF and beyond. Radical collaboration will support the next generation of inquiry – insuring that UF researchers will effectively compete for resources, using data and information resources to extend human knowledge and capability.

Additional details will be developed as planning proceeds and researchers across UF and its partners are engaged in consideration of their disciplines.

Approach to Research Computing: resources and strategy resulting in radical collaboration

Resources: Hardware provides compute cycles, network transport and storage capacity resulting in collaborative, analytic and visualization capability. Infrastructure includes access to an enormous range of software tools and technologies. Many of these must be licensed, deployed, configured, interfaced, and supported at the enterprise level. A single campus network, with high speed capability, single authentication system and single set of general purpose collaborative information resources is essential to radical collaboration. Computational specialists and scientists are needed to partner with research groups in the translation of research concepts to computational capabilities. Significant investment and support at the enterprise level will be needed.

Strategy: A comprehensive strategy for research computing in the 21st century is needed to move beyond IT as service provider to IT as enabling partner. Strategy is needed for increasing access to and reuse of data. Data volume and complexity have exploded across libraries, next-generation instruments, environmental sensors, healthcare, science facilities and computer simulations. Volume (from terabyte to petabyte scale), and complexity/dimensionality call for institutional level approaches. UF lags significantly in this area; although the recent initiation of the Integrated Data Repository project in the Health Science Center, and the libraries' institutional repository are hopeful signs. A strong data strategy will allow UF researchers to satisfy data policies by federal funding agencies and to utilize programs such as NSF's XD (eXtreme Data) program in which campus data are integrated with national-scale computational resources.

Radical collaboration: In order to achieve excellence we must develop a new model of interaction among computing specialists, support personnel, computational faculty and faculty engaged in other research within UF and with its research partners. Significant new resources will be needed to support computational specialists who can actively collaborate in the development of new resources for research. Ontologists, system administrators, developers, and data stewards will

need to be available for partnering in research. Faculty across the campus and beyond need new information resources to identify potential collaborators and build successful teams.

Radical collaboration will also require fostering and sustaining partnerships with the public and private sector. Such partnerships have enormous potential for promoting research discovery and workforce development. They should include collaborative endeavors with research universities and laboratories from across the state of Florida, the nation, and around the world; strategic alliances with major private sector information technology providers; and joint initiatives with state and federal agencies.

Specific goals for the next 18 months

Resources

- Expand the core infrastructure of the HPC center
- Deploy a new large scale storage solution for the campus
- Provide a mechanism to add high-speed networking to research groups as needed
- Create a researcher dashboard including an investigator's resources and works with information access and management tools for each. Capitalize on existing semantic information resources.

Strategy

- Create a task force for the specific purpose of developing new models for radical collaboration with IT, with computational specialists and scientists, with faculty across UF and the world. Include funding, staffing and teaming models in support of radical collaboration.
- Develop efficient plans for data storage, curation and sharing, preventing redundancy and ensure secure backup and accessibility of valuable research data.
- Create mechanisms to ensure smooth transition for researchers to expand their use of computing resources from their lab equipment, to large scale computing, to statewide and national resources, such as the NSF TeraGrid and Open Science Grid, systems at national labs, and cloud resources such as those provided by Amazon and Microsoft.

Radical Collaboration

- Add IT staff resources for the purpose of collaborating with faculty on the development of radical collaboration opportunities in information access, data storage and curation, and use of computational facilities.
- Create training sessions and topical workshops in co-ordination with regular academic classes to reduce duplication of effort. For example user training on basic login, queue submission, cluster etiquette, installation and management of software.
- Engage the library, the health science center, IFAS, and international investigators in identifying breakthrough opportunities for improving collaboration using technology.
- Explore partnerships and alliances with industry, private and public national and international consortia, and national labs to leverage expertise and resources. Create a mechanism where the University can foster and support the transformation of innovative ideas into startup ventures and economic activity.